

Westward Region Commercial Dungeness Crab and Shrimp Fisheries:

A Report to the Alaska Board of Fisheries

by

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## DUNGENESS CRAB

### *Introduction*

The Westward Area ("J") for Dungeness crab consists of all Pacific Ocean waters south of the latitude of Cape Douglas (58° 52' N.) and west of the longitude of Cape Fairfield (148° 50' W.) and all Bering Sea and Pacific Ocean waters east of the U.S. - Russian Convention line of 1867. The region is divided into four districts: Kodiak, Alaska Peninsula, North Peninsula and Aleutians (Figure 1). Vessel registration is nonexclusive for all districts except the Alaska Peninsula which has been designated superexclusive since 1989.

### *Historic Background*

The first commercial landings of Dungeness crab from the region occurred in 1962 when 1.9 million pounds were recorded from the Kodiak District (Table 1 and Figure 2). Favorable market conditions and previously unexploited stocks caused an increase in the harvest through the late 1960's to a peak in 1968. The first catch from the Alaska Peninsula of 1.3 million pounds also occurred in that year and contributed to the region's record harvest of 8.1 million pounds (Table 2).

Harvests declined through the 1970's as lower stock levels and weaker market conditions reduced production. This trend was reversed in 1980 as declines in other fisheries and increasing market demand encouraged Dungeness fishing. The 1984 harvest of 6.0 million pounds from the region was the largest since 1968. The increased effort removed the major portion of post-recruit animals from the stock and production declined shortly thereafter. The 1987 Kodiak fishery experienced a modest increase in recruitment as the catch rose with fewer vessels participating. The harvest again peaked in 1989 with a large portion of the catch composed of crabs newly recruited to the fishery. Effort and production has declined since that time with the 1995 harvest at the lowest level since the 1977 season when very few vessels participated.

Fishing effort in the Alaska Peninsula district has been sporadic ranging from a high of 18 vessels in 1983 to some years with no activity at all. Since the superexclusive designation was imposed in 1989 the highest number of vessels participating has been seven. The harvest history has also been sporadic with the largest catch occurring during the initial season in 1968.

Dungeness fishing effort in the Aleutian and North Peninsula districts has been fairly minor throughout the history of the fishery. Initial catches from the Aleutian District occurred around Unalaska Island in 1974 with the highest recorded harvest of 92,000 pounds taken by four vessels in 1984 (Table 3). There were no catches recorded from the North Peninsula district prior to 1994 when two vessels fished. Only in 1995 was the harvest nonconfidential when five vessels harvested 134,157 pounds of crab (Table 4).

The commercial fishing season opens on May 1 in all areas except the south end of Kodiak which opened June 15 (Figure 3). The season closes 14 days before the opening of the Tanner crab season. This closing date is January 1 in all areas except the North Peninsula District which closes on October 17, two weeks prior to the Bering Sea Tanner crab season opening. The closure has been made effective by emergency order in areas where the Tanner crab fishery has been closed.

The commercial fishing season has remained essentially the same since 1977. Prior to that time the season was open year round. The closed period was established during the winter when storms and weather generally prevented fishermen from operating. This season required that all gear be removed from the water and was an effort to reduce the amount of "derelict gear" on the grounds. The June 15 opening date for Kodiak's south end was chosen due to the high incidence of female king crab encountered before that date.

Another aspect of the Dungeness crab fishery has been the discovery in 1992 of the toxin causing paralytic shellfish poisoning (PSP) in the viscera of crab. A drop in ex-vessel value is attributed to restrictions by the Department of Environmental Conservation (DEC) against the sale of live or wholecooked crabs.

### *1996 Fishery*

The 1996 fishery opened on May 1 in all areas except Kodiak's south end which opened on June 15. Effort in the region was the lowest since 1980 with a total of 26 vessels participating. The Kodiak District had 21 vessels which made 113 landings harvesting 668,772 pounds (Figure 4). Interest in fishing Dungeness crab also was low as shown by the number of landings as compared to other years. The Alaska Peninsula catch of 112,388 pounds was taken by 4 vessels in 19 landings. There was no effort in the Aleutians during 1996, while only one boat fished in the North Peninsula. The catch remains confidential where less than 3 vessels participate. All areas remained open to fishing until January 1 with the exception of the North Peninsula which closed October 17.

Early season effort was minimal as fishermen use May primarily as a gear staging time. There were only 4 landings from the Kodiak District during May 1996. The majority of the catch, nearly 70%, came during the months of July and August (Table 5). The fishery in the Alaska Peninsula occurred from late August through September after the participating vessels finished with salmon season. The ex-vessel value of landed crab averaged \$1.01 per pound for a total value of approximately \$800,000 to the fleet.

The 1996 season was marked by the continued presence of the toxin causing PSP in the viscera of Dungeness crab. Whole-cook markets were restricted and the Department of Environmental Conservation continued to use action levels established in 1993 to regulate Dungeness crab processing in Kodiak. When levels of PSP were found to be greater than 70 micrograms per 100 grams, restrictions against whole cooked crabs and live sales were enacted. Consumers were warned of the danger of eating crab "butter". Most areas around Kodiak were restricted for the

entire 1996 season except the North Mainland Section where PSP levels were found to be safe. Some sales of live crabs from this area did occur.

The carapace width of crab landed during the 1996 season averaged 174mm. or 6.9 inches (Figure 4). This compares to the 177 mm average carapace width the previous season. Only a few of the measured crab have been in excess of 8.0 inches (203mm) in carapace width since 1991.

## SHRIMP

### *Trawl Fishery Historic Background*

The Westward Region shrimp fishery began with a harvest of 31,886 pounds in 1958. The fishery grew rapidly to an annual catch of 10 to 12 million pounds in the early 1960s. The fishery slowed when shore plants and the fishing fleet were badly damaged by the 1964 earthquake and tidal wave, but then grew rapidly to a peak Kodiak District harvest of 82.2 million pounds in 1971 (Table 6, Figure 5). As Kodiak shrimp catches declined in the 1970s, much of the vessel effort shifted into the Chignik and South Peninsula Districts. The region harvest peaked in 1976 at 120 million pounds. The northern pink shrimp, *Pandalus borealis*, has predominated the harvest contributing over 95% by weight. Other species landed included sidestripe, coonstripe, spot and humpy shrimps.

Stock abundance and fisheries declined sharply thereafter. Factors that may be related to the decline included an increase in ocean temperature and increases in predator populations. Pacific cod stocks were notably increasing in nearshore areas. Evidence that fishing mortality had a limited role in the decline of shrimp abundance was found when areas that were not fished declined similarly to those that were.

No regulatory measures were promulgated in the Kodiak shrimp fishery until 1970 when an egg hatch closure was enacted during March and April for some bays and nearshore areas. In 1971 a quarterly quota system was adopted to provide harvest throughout the year while not allowing unrestricted harvest. In the late 1970s, the quarterly quota system was reduced to a single opening for certain areas and staggered opening dates for many of the fishing sections, while others retained two fishing periods in fall and winter. Most of the adjustments to season dates was due to industry's desire to spread harvest out over a longer time period while trying to prevent conflicts with vessels and processing in other fisheries. Also, during the late 1970s, stocks in some areas were not large enough to support fisheries, and these areas were opened and closed by emergency order.

The Department of Fish and Game conducted a voluntary logbook program beginning in 1967. This database, plus trawl surveys conducted by the department since the early 1970s, provided a means for establishing harvest levels. The system was flexible during its developing stage, but in 1981 the industry demanded this management scheme be defined. This led to the *Westward Region Shrimp Management Plan* which was approved by the Board of Fisheries in 1982. The objectives of this management plan were to maintain shrimp stocks at a level termed "representative biomass

index" (RBI) determined by survey trawls, while allowing a fishery during rebuilding periods. A minimum level at which any harvest would occur was established and termed the "minimum acceptable biomass index" (MABI).

Concurrent with approval of the *Westward Region Shrimp Management Plan*, the BOF also enacted an additional management strategy as an "economic alternative" known as the *Mainland Shrimp Management Plan*. This alternative strategy allowed shrimp fishing in some bays on the Alaska Peninsula and around Afognak Island irregardless of survey results. Specifics can be found in the commercial shellfish regulations under 5 AAC 31.530.

Since both of these management plans have been in effect, stocks have continued to decline. Under the *Westward Region Shrimp Management Plan* none of the historic production areas have been open the past 12 years. The Mainland fishery, while open, has had very little harvest or effort. In the last several years, a couple of vessels have made minor landings exploring deeper waters around the island. Landings from one vessel occurred in 1996.

### *Stock Status*

The department has continued to survey shrimp stocks from some key historic producing areas on a triennial basis. The most recent survey was in 1995. Shrimp were caught over a widely scattered area but at low densities. The best sign was found in the deepest stations, generally over 90 fathoms where fish populations were lower than average. Modest increases were noted in Marmot Bay shrimp stocks (Table 7). Survey estimates remained considerably below levels required to trigger a fishery opening in the surveyed bays (Table 8).

### *Pot Shrimp Fishery*

Pot shrimping has never been a large fishery in Kodiak and is virtually nonexistent in the rest of the region. The largest harvest was less than 19,000 pounds of spot shrimp tails in 1983 (Table 9). There has only been one year out of the last six that any operator has participated. No one fished in 1996.



Table 1. Dungeness crab commercial catch and effort by fishing year for the Kodiak Management District, 1962-1996.

Year	Lndgs	Vssls	Commercial Catch		Pots Lifted	Avg Lbs Per Lndg	CPUE	Avg Price Per Lb	Exvessel Dollars
			No. Crab	No. Pounds					
1962 <sup>a</sup>	149	-	-	1,904,567	-	12,782	-	\$ .09	171,000
1963	354	-	-	2,487,512	-	7,026	-	.09	224,000
1964	395	29	-	4,254,565	-	10,537	-	.09	375,000
1965	351	25	-	3,311,571	-	9,434	-	.12	397,000
1966	144	12	-	1,416,174	-	7,976	-	.13	149,000
1967	439	18	-	6,663,668	-	15,179	-	.13	866,000
1968	536	43	-	6,829,061	-	12,741	-	.14	956,000
1969	455	29	-	5,834,628	190,967	12,823	12	.16	934,000
1970	318	33	-	5,741,438	249,800	18,005	9	.14	804,000
1971	173	24	515,653	1,445,864	90,913	8,358	6	.18	260,000
1972	316	34	766,960	2,059,536	140,921	6,517	6	.40	824,000
1973	487	42	879,484	2,000,526	251,467	4,108	3	.50	1,000,000
1974	172	23	337,839	750,057	104,062	4,361	3	.47	353,000
1975	154	15	307,272	639,813	76,411	4,154	4	.61	390,000
1976	6	4	38,072	87,110	4,410	14,518	9	.15	13,000
1977 <sup>b</sup>			Confidential						
1978	173	20	618,357	1,362,306	93,633	7,875	6	.75	1,022,000
1979	237	28	595,850	1,311,275	137,951	5,543	4	.75	943,000
1980	197	21	968,829	2,011,736	107,261	10,212	9	.45	905,000
1981/82 <sup>c</sup>	466	50	2,614,545	5,566,463	295,138	11,945	9	.70	3,897,000
1982/83 <sup>d</sup>	991	111	2,004,075	4,546,311	481,542	4,588	4	.75	3,410,000
1983/84	1,079	103	2,044,505	4,752,148	503,464	4,408	4	1.05	4,989,000
1984/85 <sup>e</sup>	1,163	106	2,393,974	5,303,052	627,441	4,564	4	1.45	7,689,000
1985 <sup>e</sup>	1,243	125	1,791,446	4,160,435	599,291	3,347	3	1.20	4,992,522
1986	577	81	439,738	967,423	199,881	1,667	2	1.15	1,112,500
1987	379	45	747,117	1,450,983	150,067	3,828	5	1.26	1,828,000

-Continued -

Table 1. (page 2 of 2)

Year	Lndgs	Vssls	Commercial Catch		Pots Lifted	Avg Lbs Per Lndg	CPUE	Avg Price Per Lb	Exvessel Dollars
			No. Crab	No. Pounds					
1988	363	50	1,064,387	2,125,114	203,217	5,854	5	1.06	2,253,000
1989	359	47	1,428,973	3,077,937	185,242	8,574	8	1.10	3,385,730
1990	519	62	1,294,241	2,937,306	296,168	5,660	4	1.54	4,435,000
1991	732	62	695,470	1,414,499	279,872	1,932	2	1.37	1,938,000
1992	501	46	805,215	1,656,793	218,602	3,306	4	.86	1,425,000
1993	263	42	647,736	1,369,889	180,534	5,209	4	.92	1,260,000
1994	162	31	426,848	948,461	151,888	5,855	3	1.20	1,138,000
1995	106	24	257,677	527,434	107,506	4,976	2	1.72	907,000
1996	113	21	334,237	668,772	88,682	4,223	4	1.01	675,460

<sup>a</sup>Season open year round 1962 - 1976<sup>b</sup>Open May 1 through December 31, 1977 - 1980<sup>c</sup>Open February 27, 1981 through February 1, 1982<sup>d</sup>Open May 1, 1982 through February 1, 1983<sup>e</sup>Open May 1, 1985 through December 31, 1985

Table 2. Dungeness crab harvest statistics, Alaska Peninsula District, 1968-1996.

Year	Vssls	Lndgs	No. of Crab <sup>a</sup>	No. of Pounds <sup>a</sup>	Pots Lifted	CPUE	Avg. Wt.	Price Per #
1968	NA	NA	434,142	1,259,013	NA	NA	2.9	NA
1969	NA	NA	411,000	1,056,000	NA	NA	NA	NA
1970	NA	NA	4,200	13,000	NA	NA	NA	NA
1971	NA	NA	3,900	11,000	NA	NA	NA	NA
1972	NA	NA	29,400	65,000	NA	NA	NA	NA
1973			C o n f i d e n t i a l					
1974			N O E F F O R T					
1975			N O E F F O R T					
1976			N O E F F O R T					
1977			N O E F F O R T					
1978			N O E F F O R T					
1979			C o n f i d e n t i a l					
1980			N O E F F O R T					
1981/82			C o n f i d e n t i a l					
1982/83	16	79	357,955	779,600	59,265	6	2.2	\$ .75
1983/84	18	132	565,430	1,207,128	113,061	5	2.1	\$ .97
1984/85	13	99	294,191	647,497	106,056	3	2.1	\$ 1.38
1985/86	7	31	239,202	488,107	52,117	5	2.0	\$ 1.26
1986/87	6	28	87,925	180,261	30,280	3	2.0	\$ 1.05
1987/88	6	21	88,744	182,706	22,588	4	2.1	\$ 1.11
1988			C o n f i d e n t i a l					
1989			C o n f i d e n t i a l					
1990	4	10	31,074	65,806	5,225	6	2.1	\$ 1.53
1991	7	18	39,069	80,248	12,813	3	2.1	\$ 1.24
1992			C o n f i d e n t i a l					
1993	3	15	127,979	273,811	15,675	8	2.1	\$ .79
1994	4	24	134,429	277,639	27,950	5	2.1	\$ 1.01
1995			C o n f i d e n t i a l					
1996	4	9	52,694	112,438	16,557	3	2.1	\$1.11

NA = Not Available.

<sup>a</sup>Includes deadloss.

Table 3. Aleutian District historic Dungeness crab catch statistics, 1974-1996.

Year	Season Dates	Vessels	Number of Landings	Crab <sup>a</sup>	Harvest <sup>a,b</sup>	Pots Pulled	Average Weight <sup>b</sup>	CPUE <sup>c</sup>	Price Per Pound
1974	1-1/12-31				Confidential				
1975	1-1/12-31				Confidential				
1976	5-1/12-31				N O C A T C H				
1977	5-1/12-31				N O C A T C H				
1978	5-1/12-31				Confidential				
1979	5-1/12-31								
1980	5-1/12-31				N O C A T C H				
1981	5-1/ 2-1				N O C A T C H				
1982/83	5-1/ 2-1				Confidential				
1983/84	5-1/ 2-1				Confidential				
1984/85	5-1/ 2-1	4	50	40,128	91,739	13,555	2.3	3	\$1.15 to \$1.50
1985	5-1/ 2-1				Confidential				
1986	5-1/12-31	2	9	4,851	10,897	1,095	2.2	4	\$0.90
1987	5-1/12-31	5	43	13,247	26,627	2,987	2.0	4	\$0.95
1988	5-1/12-31	6	45	10,814	22,634	2,581	2.1	4	\$0.90
1989	5-1/12-31	4	31	5,165	11,124	2,078	2.1	2	\$0.90
1990	5-1/12-31	3	11	8,379	17,365	1,345	2.1	6	\$0.90
1991	5-1/12-31	4	14	3,654	7,412	732	2.0	5	\$1.25
1992	5-1/12-31	4	13	2,854	5,649	555	2.0	5	\$0.80
1993	5-1/12-31	5	12	3,448	7,531	797	2.2	4	\$0.78
1994	5-1/12-31			N O	R E P O R T E D	C A T C H			
1995	5-1/12-31			N O	R E P O R T E D	C A T C H			
1996	5-1/12-31			N O	R E P O R T E D	C A T C H			

<sup>a</sup>Deadloss included.<sup>b</sup>In pounds.<sup>c</sup>Defined as catch per pot pull.

Table 4. Dungeness crab harvest statistics, North Peninsula District, 1994-1996.

Year	Vssls	Lndgs	No. of Crab <sup>a</sup>	No. of Pounds <sup>a</sup>	Pots Lifted	CPUE	Avg. Wt.	Price Per #
1994				Confidential				
1995	5	18	63,613	134,157	34,469	1	2.1	\$1.30
1996				Confidential				

Table 5. Dungeness crab commercial catch by statistical area and month from the Kodiak District, 1996.

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STAT AREA	NO. VSSLS	NO. LNDGS	POUNDS HARVESTED	AVG. WT.	CPUE	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
525701	3	22	95,304	2.0	3	2,092	18,602	26,316	32,882	9,076	6,336	-	-
525703	5	13	29,769	2.0	3	-	-	11,839	13,431	4,499	-	-	-
525733	3	11	6,865	2.0	2	-	843	1,478	1,693	2,600	-	251	-
535631	3	4	10,251	2.0	5	-	845	-	8,468	938	-	-	-
535701	4	7	14,931	2.0	1	930	-	7,246	3,277	873	2,901	518	-
535703	3	7	27,860	2.0	4	1,844	1,973	6,246	5,941	5,106	6,750	-	-
535705	4	6	33,283	1.9	6	1,130	5,184	14,038	13,272	2,801	2,042	-	-
545601	6	34	339,937	2.0	4	-	3,362	106,391	146,742	67,729	12,747	2,966	-
545802	4	11	14,082	1.9	3	-	-	485	3,519	2,519	5,776	1,783	-
<sup>a</sup>	18	30	96,490	2.0	5	-	3,691	2,093	37,068	21,867	12,940	0	0
TOTAL	21	113	668,772	2.0	4	5,996	29,316	194,968	266,293	118,008	46,586	3,118	0

<sup>a</sup> Stat area totals have been combined to protect vessel confidentiality

Table 6. Historic commercial trawl shrimp catch and effort for the Kodiak District of Westward Statistical Area 'J', 1958-1996.

Calendar Year	Fishing Year	Vessels	Landings	Harvest in Pounds	Price
1958		-	-	31,886	\$.035
1959		-	-	2,861,900	.035
1960		11	94	3,197,985	.039
1961		12	203	11,083,500	.04
1962		11	204	12,654,027	.04
1963		-	-	10,118,472	.043
1964		6	-	4,339,114	.04
1965		11	320	13,823,061	.04
1966		17	551	24,097,141	.045
1967		23	-	38,267,856	.045
1968		16	-	34,468,713	.04
1969		26	935	41,353,461	.055
1970		18	1,024	62,181,204	.04
1971		49	1,746	82,153,724	.04
1972		63	1,398	58,352,319	.04
1973		50	1,283	70,511,477	.055
	1973/74	63	1,029	56,203,992	.08
	1974/75	75	1,100	58,235,982	.08
	1975/76	58	884	49,086,591	.08
	1976/77	62	762	46,712,083	.10
	1977/78	58	653	26,409,366	.13
	1978/79	50	328	20,506,021	.165
	1979/80	37	242	12,863,536	.225
	1980/81	67	462	27,101,218	.29
	1981/82	55	298	19,112,367	.27
	1982/83	40	224	10,391,207	.27
	1983/84	14	63	2,779,030	.35
	1984/85	13	59	2,942,922	.33
	1985/86	5	26	1,145,980	.20
	1986/87		Confidential		
	1987/88		Confidential		
	1988/89	0	0	0	.00
	1989/90	0	0	0	.00
	1990/91	0	0	0	.00
	1991/92	0	0	0	.00
	1992/93	0	0	0	.00
	1993/94	3	3	1,704	N.A
	1994/95	0	0	0	.00
	1995/96	0	0	0	0
	1996/97			Confidential	
Fishing Year Averages <sup>a</sup>		33	556	25,917,820	\$.12

<sup>a</sup>Average calculated from years 1960-1985.

Table 7. September ADF&G shrimp population estimates in millions of pounds from selected areas, 1974-1995.

AREA	MABI <sup>a</sup>	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1989	1992	1995
Chiniak	1.45	0	0	0	0	0	0	5.6	3.90	0.31	0.03	2.05	1.20	0.00	0.50	0.22	0.38	0.17
Marmot	29.24	0	0	0		10.5	7.85	3.65	4.31	4.09	0.98	2.53	0.81	0.00	0.78	1.87	1.11	2.84
Kliiuda Bay	5.3	14.3	0	21.3	0	1.12	0	2.24	0.97	0.02	0.04	0.47	0.14	0.25	0.00	0.75	0.32	0.13
Twoheaded Gully	7.3	17.1	0	0	0	4.36	6.27	13.44	3.04	2.65	0.00	0.31	0.27	0.55	0.00	0.10	1.16	0.13
Alitak Bay	4.28	0	0	0	0	0	0	23.64	5.44	1.89	3.64	3.52	1.15	0.21	0.17	0.19	0.21	0.02
Uyak Bay	3.19	0	0	0	0	0	0	1.44	0.51	0.30	0.00	0.56	0.12	0.00	0.00	0.12	0.16	0.23
Uganik Bay	2.59	0	0	0	0	0	0	1.9	1.81	0.00	0.00	1.55	0.24	0.00	0.16	0.48	0.48	0.93
Wide Bay	1.05	0	0	0	0	0	3.76	2.03	1.4	0.71	0.00	2.09	0.45	0.49	1.50	0.73	0.92	0.08
Chignik Bay	4.55	16.32	10.7	10.6	8.76	12.23	0	14.67	0.96	1.19	1.24	2.05	0.00	0.00	1.11	0.51	2.01	1.00
Kuiukta Bay	1.9	5.2	3.89	5.2	2.4	3.12	0	0.47	0.036	0.00	0.00	0.00	0.00	0.41	0.52	0.18	0.69	0.36

<sup>a</sup> Minimum Acceptable Biomass Index (MABI)



Table 8. ADF&G shrimp population survey estimates, 1995.

Area	MABI	1995
	(millions lbs)	
Chiniak	1.45	0.17
Marmot	29.24	2.84
Kiliuda Bay	5.3	0.13
Twoheaded Gully	7.3	0.13
Alitak Bay	4.28	0.02
Uyak Bay	3.19	0.23
Uganik Bay	2.59	0.93
Wide Bay	1.05	0.08
Chignik Bay	4.55	1.00
Kuiukta Bay	1.9	0.36

<sup>a</sup>Minimum Acceptable Biomass Index (MABI)

Table 9. Commercial pot shrimp catch statistics, Kodiak District of Statistical Area 'J', 1969-1996.

Year	Vessels	Landings	Pounds
1969		Confidential	
1970		20	12,302
1971		0	0
1972		Confidential	
1973		Confidential	
1974	6	73	10,336
1975	7	77	12,782
1976		Confidential	
1977	3	26	2,565
1978		Confidential	
1979		Confidential	
1980	4	25	4,700
1981	4	6	2,511
1982	6	18	9,754
1983	12	31	18,686
1984	6	21	4,361
1985		Confidential	
1986		Confidential	
1987		0	0
1988		Confidential	
1989		Confidential	
1990		Confidential	
1991		0	0
1992		0	0
1993		0	0
1994		Confidential	
1995		0	0
1996		0	0

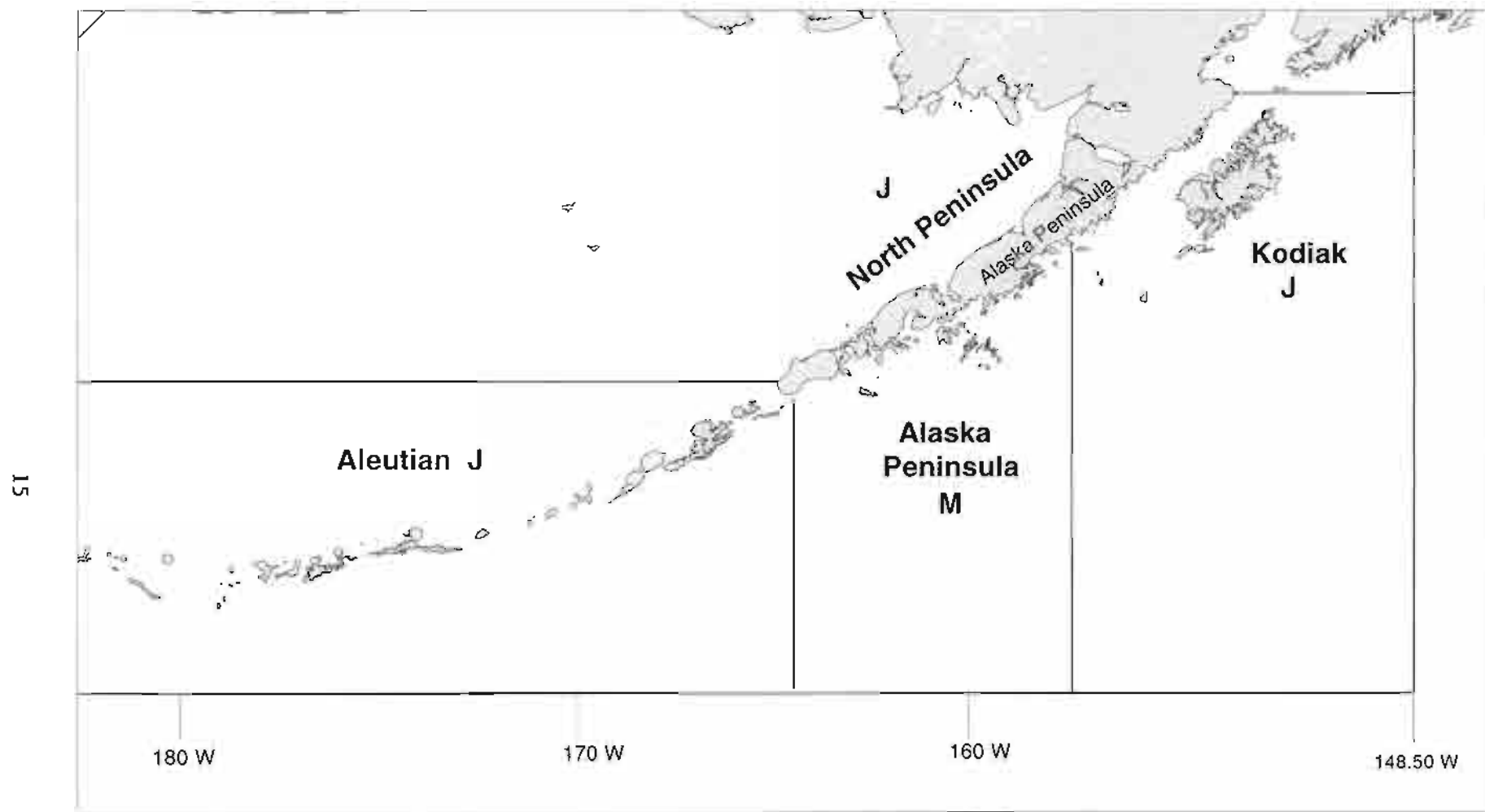


Figure 1. Westward Region Dungeness Crab Fishing Districts.

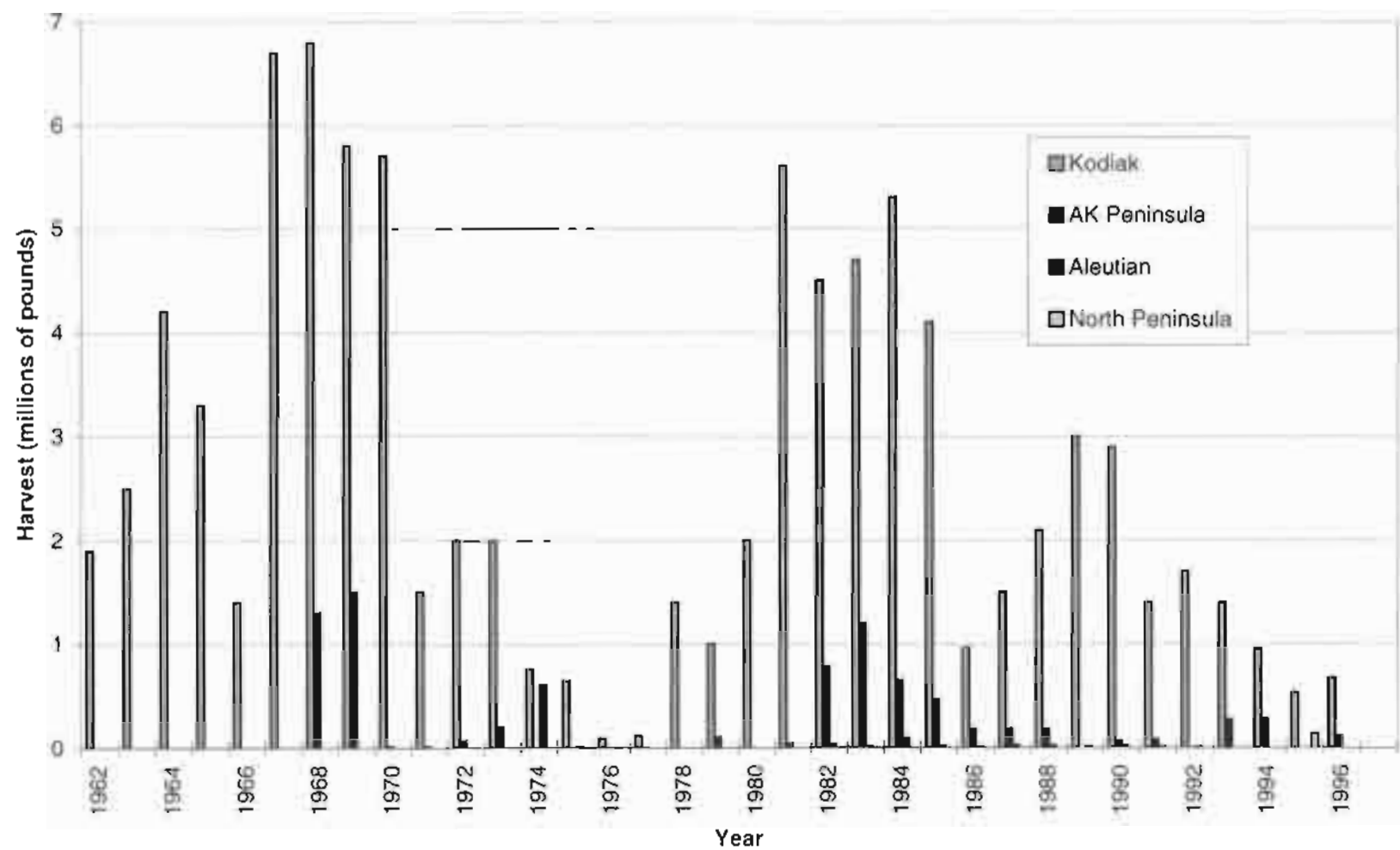


Figure 2. Westward Region commercial Dungeness crab harvest.

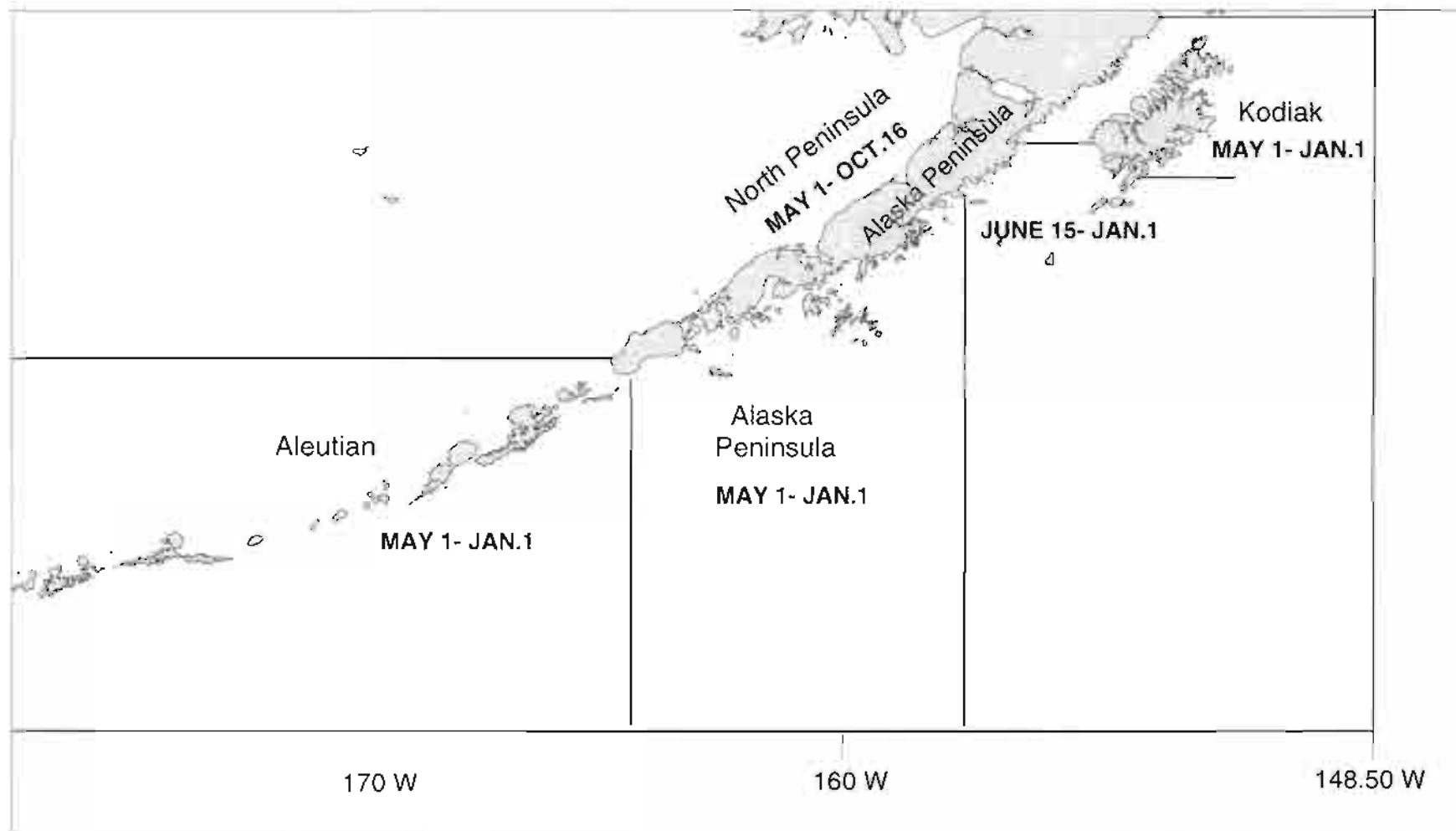


Figure 3..Westward Region Dungeness crab fishing districts and season.

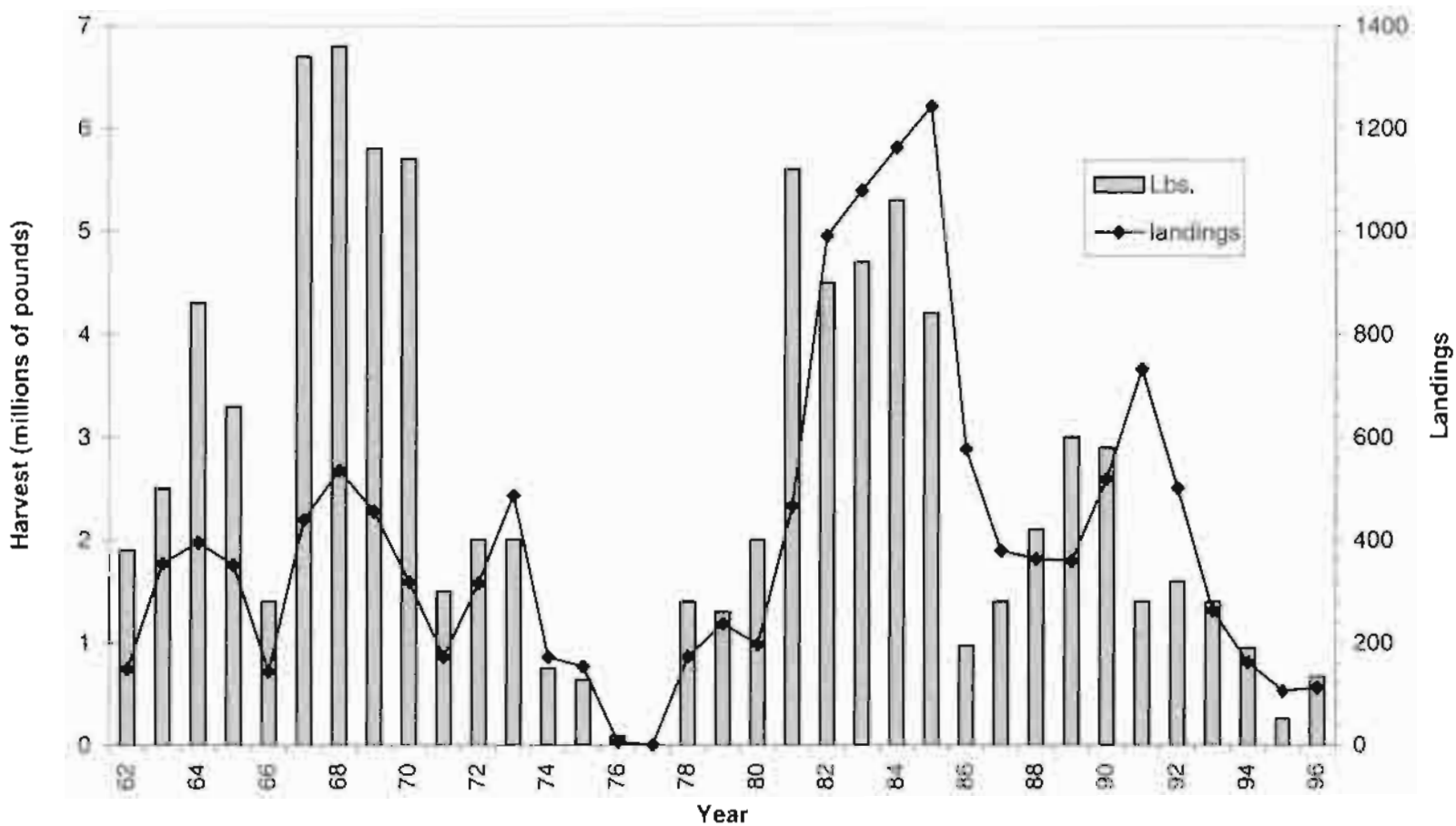


Figure 4. Kodiak district commercial Dungeness catch and effort, 1962-1996.

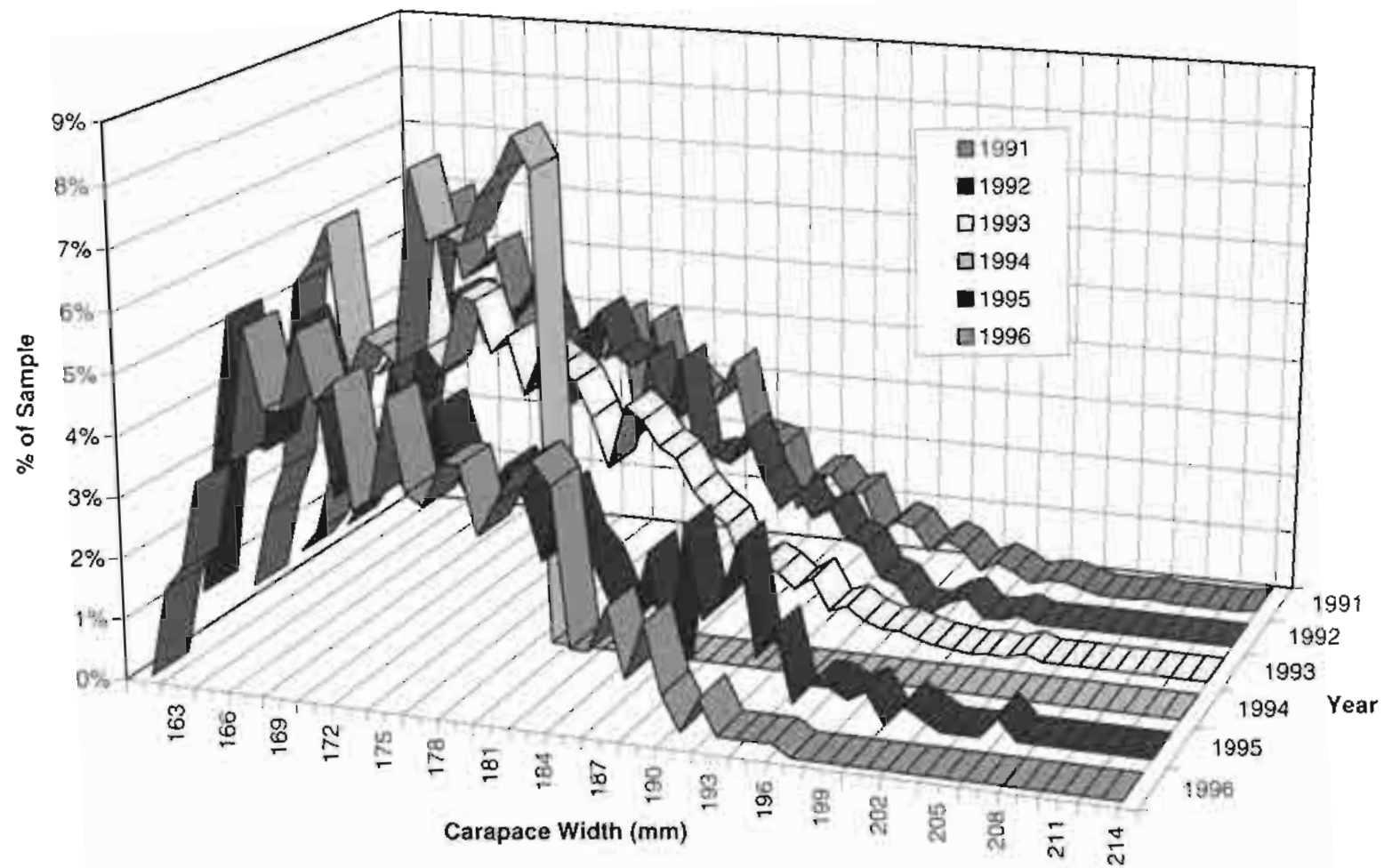


Figure 5. Kodiak district commercial Dungeness crab length frequencies, 1991-1996.

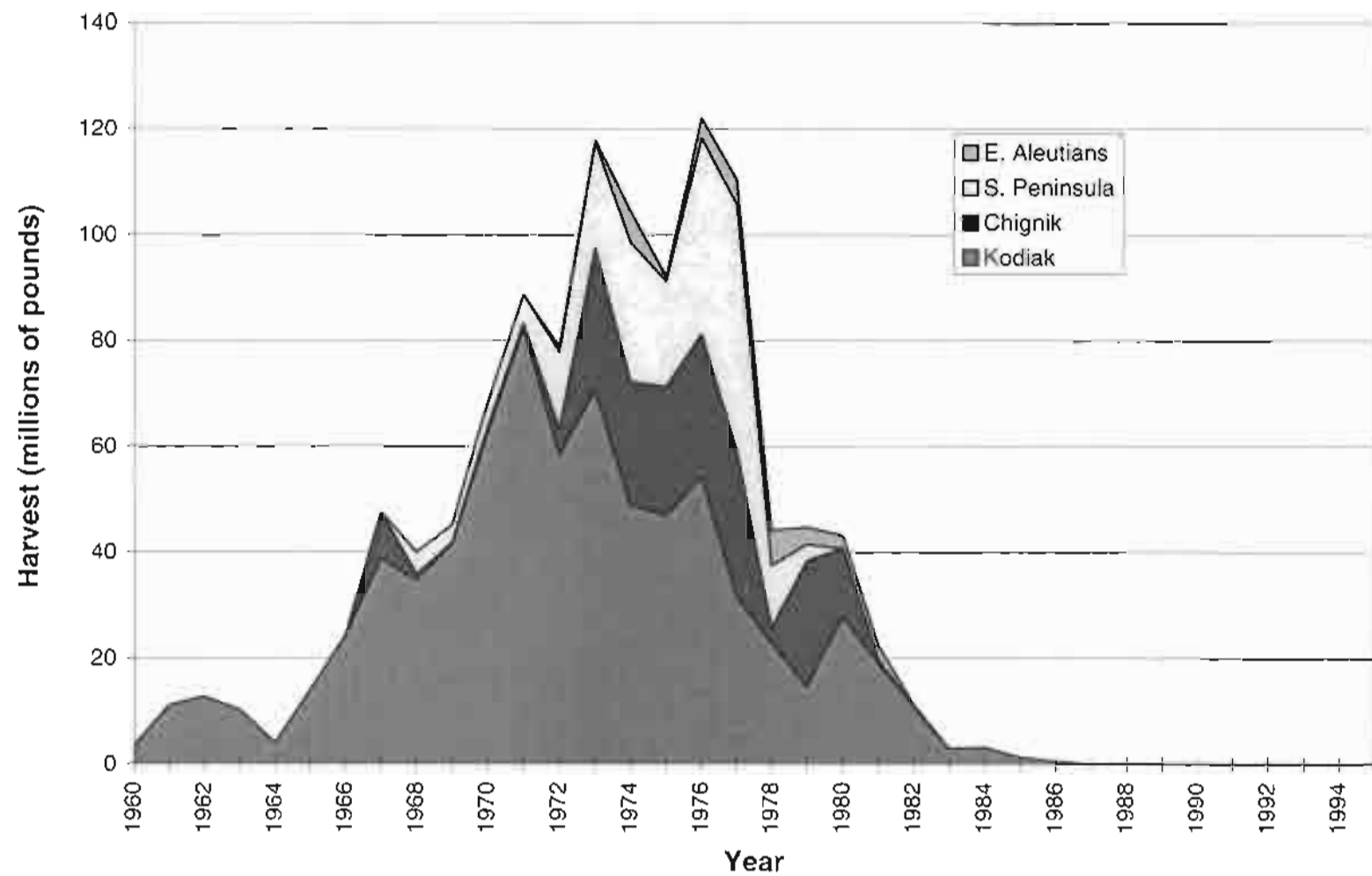


Figure 6. Westward Region trawl shrimp harvest, 1960-1994.



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